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THE CYPRUS AGRICULTURAL JOURNAL

Cattle: Grazing Trials, 1936

A Quarterly Review of the Agriculture, Forestry and Trade of Cyprus

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Cyprus Persian Wheel "Alakati."

The Cyprus Agricultural Journal

A QUARTERLY REVIEW

OF THE

AGRICULTURE, FORESTRY AND TRADE OF CYPRUS

Vol. XXXI, Part 2 JUNE, 1936 Price 3cp.

EDITORIAL NOTES.

Agricultural Situation.

The outstanding feature affecting the agricultural situation and outlook during the past quarter has been the heavy and continuous rains during May and the exceptionally cool weather in the early part of June.

The rain for May is well above the average over an extended period of years for practically all parts of the Island and this unseasonal weather has had a disturbing effect on the agriculture of the Island. Considerable damage was caused to harvested cereals on the threshing floor and to sheaves lying in the fields and standing cereals were badly damaged by rust. The variations in temperature are likely to affect next season's olive and citrus crops owing to the adverse effect at the time of flowering. Cherries and other stone fruits suffered from the excess of rains and the almond crop is poor. On the other hand all summer crops will benefit and the production of apples will be good.

The prices for cereals reacted to the climatic conditions and the price of wheat soared to 5*s*. per kilé but it is expected the price will drop when the delayed threshing continues and ample supplies of local grain come on to the market.

* * * * * * *

Shipping Services for Citrus Fruits.

The following resolution was passed at a meeting of the Cyprus Shippers' Association held on the 25th April, 1936 :—

> "This Council considers that conditions of shipment of citrus fruit are not likely to be improved unless all Shippers of such fruit are prepared to join together to deal as a whole with Shipping Companies and to guarantee quantities for shipment. It, therefore, recommends that all shippers of oranges be called upon to join an Association of Orange Shippers, which should be a section of the Association for the purpose of securing better shipping service."

A Sub-Committee consisting of the Director of Agriculture, Comptroller of Customs and Inland Revenue and Mr. Zenon Pierides was appointed to deal with the proposal and on the 17th May a meeting was held at Famagusta which all exporters of citrus fruits were invited to attend. As a result of the Famagusta meeting a Committee was elected consisting of Messrs. Ioannis Ioannou, Prodromos Papadopoulos and Ioannis G. Marangos for drawing up the Rules of the proposed Association of Orange Shippers for consideration by the Cyprus Shippers Association.

* * * * * * *

INSPECTION OF ONIONS FOR EXPORT.

Regulations under the Agricultural Produce (Export) Law, 1933, providing for the inspection of onions before export are likely to be introduced at an early date. These regulations are based on the Agricultural Produce (Potato) Export Regulations, 1935, now in force.

* * * * * * *

RURAL EXTENSION EDUCATION.

Mr. B. J. Weston, Superintendent of Agriculture, left Cyprus on the 9th June, 1936, on vacation and duty leave. Mr. Weston will visit Macedonia for a short period to study the development made in Rural Extension Education there which the Near East Foundation have conducted for some years.

* * * * * * *

DEVELOPMENT OF TRADE WITH PALESTINE AND EGYPT.

Mr. G. M. Pietroni, the Trade Development Officer, represented Cyprus at the Levant Fair at Tel-Aviv early in May. Mr. Pietroni returned to Cyprus *via* Egypt where he made investigations on the marketing of Cyprus products in Egypt. Various travel agencies were also visited with a view to stimulate further interest in Egypt to the advantages of Cyprus as a tourist and holiday resort.

* * * * * * *

AGRICULTURAL SHOWS.

An Agricultural, Animal and Industrial Show was held at Larnaca on the 31st May, 1936, on the occasion of the " Kataklysmos " festival.

The new Municipal Market was opened by His Excellency the Governor during the period of the Show and Fair and these events attracted a considerable number of visitors to Larnaca.

Forthcoming Shows during the year are :—

8th September, 1936, Lysi Agricultural and Animal Show.

4th, 5th and 6th October, 1936, Paphos District Agricultural Show to be held at Ktima.

Proposals are also under consideration to hold Shows at Kyrenia, Morphou and Limassol, but the dates have not yet been fixed. The Larnaca Poultry Show will be held during December, 1936, and proposals are under consideration for village fruit and vegetable shows at Kiti, Pervolia and Agros during the Autumn.

AWARD OF PRIZES TO SCHOOL GARDENS FOR THE SCHOOL YEAR 1935–36

The Colony prize for the best School Garden for the School Year was awarded to Anoyira School. Mr. Antonis Kontoyannis is the Schoolmaster who was in charge of the School during the year.

District and Area prizes were awarded for the best two gardens as follows :—

District or Area	*School*	*Schoolmaster*
Nicosia	Yerolakkos	M. Mavromatis and others.
,,	Peristerona	E. Sotiriou.
Lefka	Evrykhou	I. Myrianthousis.
Larnaca	Agros	M. Haji Georghiou and others.
,,	Pera Khorion	Chr. Christodoulides.
Famagusta	Yialousa	Iacovos Iacovides and others.
,,	Ayios Nicolaos	G. Avraam.
Paphos	Ayios Therapon	S. Stylianides.
,,	Yeroskipos	A. Dinglis and others.
Kyrenia	Myrtou	N. Zembilas.
Trikoukkia	Phini	H. Pantelis.

* * * * * * *

LOCUST CAMPAIGN.

The first centres for the purchase of locusts were opened on 30th March and the last centres were closed on 23rd May. For part or the whole of this period centres were open at twelve villages. The total quantity of locusts destroyed was 24,746 okes, compared with 3,774 okes last year and 162,219 okes in 1927.

The occurrence of the Moroccan locust, known as the " true locust " was considerably greater than last year, and the occurrence of the Italian locust, known as " tsakracrida," was very much greater, and several species of grasshoppers were also very abundant.

* * * * * * *

BULLETIN OF THE IMPERIAL INSTITUTE.

With effect from the January–March, 1936, issue of the Bulletin of the Imperial Institute this publication will be published by the Imperial Institute itself. The general format of the Bulletin remains unchanged but some improvements in the scope of the Bulletin have been effected with a view to appealing to a wider circle of readers. More space will be devoted to the various aspects of the work of the Institute which will include the results of the more important laboratory investigations, articles and notes on plant and animal products and a record of developments in the Public Exhibition Galleries and Cinema of the Institute. An important feature will be the section on subjects of mineral interest. The price has been reduced to 2*s*. 6*d*. per number, by post 2*s*. 9*d*. (annual subscription 10*s*. post free).

SERICULTURAL NOTES.

Production of Silk Coccoons.

Generally the rearing of silkworms seems to have been satisfactory. Although the weather during the last days of rising in some areas was rainy and wet, still owing to precautions taken by the rearers as instructed by the travelling agricultural officers the damage owing to diseases, and especially to Flasherie and Grasserie which are favoured by damp weather, was very little.

In many places lack of mulberry leaves was experienced and rearers, some of whom had uprooted a good number of mulberry trees, were obliged to buy leaves at 1–1½*cp.* per oke to feed their silkworms. On account of the depressed prices of the cocoons at present this system does not pay and rearers are advised to hatch out only such a quantity of silkworm eggs as they can be sure of feeding with their own mulberry leaves.

New cocoons appeared in the market after the 10th May and were purchased by merchants at 1*s.* per oke. Owing to the low prices a very small quantity will be offered to the market, the larger quantity being reeled for domestic use.

The total production of cocoons in Cyprus this year is estimated at 100,000 okes approximately.

* * * * * * *

Demonstrational Silkworm Rearing in Girls' Schools.

Demonstrational silkworm rearings have been carried out in 144 girls' schools in various parts of the Island, and the schoolmistresses and schoolgirls engaged in the feeding and care of the worms, and the girls followed the various stages from the hatching of the silkworm eggs to the production of the cocoons.

Many rearers visited the demonstrational rearings in their villages and saw the improved methods of hatching and rearing the worms.

Cocoons produced from these rearings are much better in quality than those produced by the old methods and many persons who were trained in these improved methods while at school now follow these methods in their own rearings.

* * * * * * *

Statement showing the number of mulberry trees 3 years old and over, in each District for the last five years.

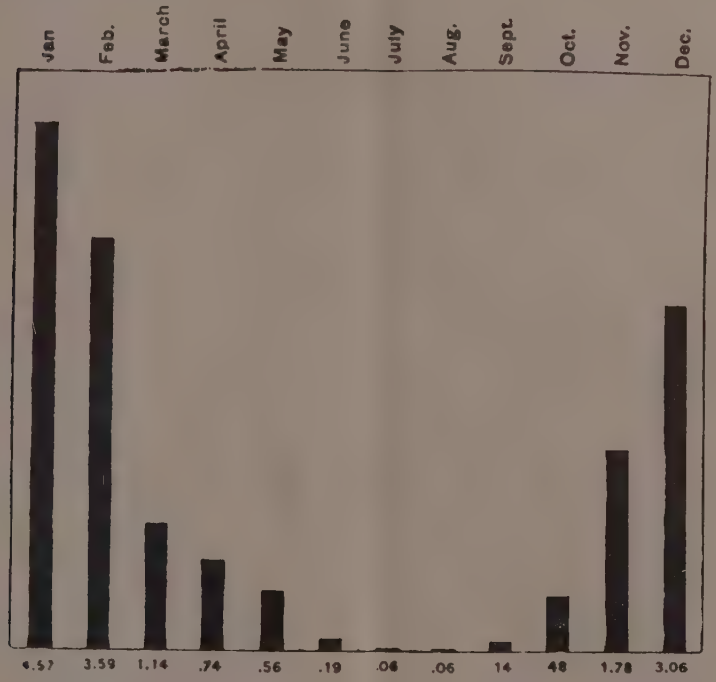
District	1931	1932	1933	1934	1935
Nicosia	76,815	85,014	89,986	92,450	97,166
Larnaca	30,343	40,120	45,161	49,687	53,802
Limassol	33,512	37,047	38,890	43,528	45,143
Famagusta	120,930	123,991	125,984	127,373	126,092
Paphos	82,615	87,297	88,353	85,779	82,978
Kyrenia	128,425	127,616	124,576	117,565	115,105
Total	472,640	501,085	513,890	516,382	520,286

Irrigation in Cyprus.

BY A. PITCAIRN, *Assistant Director of Agriculture.*

INTRODUCTION.

IRRIGATION is of considerable economic importance to Cyprus and the growing of crops by irrigation has been practised in the Island since ancient times. In the coastal and central plain areas the climate is arid in character and the average monthly rainfall of these areas for a period of ten years, which is illustrated below shows that the rainfall is distributed over the winter months with practically no rain during the hot summer months.



Average Monthly Rainfall in inches – Coastal & Central Plain

10 Years 1925 - 1934

This seasonal distribution of the rains permits the practice of a system of dry farming and such crops as cereals, beans, vetches, olives, almonds, vines and other crops are produced in considerable quantities. With the application of more modern and scientific methods of agricultural practices the yield of the crops produced by dry farming would be increased and the possibilities of crop failures in years of drought or during season when the distribution of the rainfall is unfavourable would be lessened.

Where irrigation water is available more intensive methods of farming are practised and a wider range of crops are produced. Without irrigation it would not be possible to produce in Cyprus such crops as citrus fruits and most of the fodder and summer crops which are now grown.

Owing to the number of crops which can be produced by dry farming being limited, irrigation is necessary for the needs and development of the Island but there are many areas where irrigation water is not available and there are also lands which are unsuitable for development under irrigation. therefore, further progress in agriculture in Cyprus lies in improving the existing system of dry farming and supplementing it by irrigation farming wherever it is possible.

The value of water to be used for irrigation purposes depends upon the quantity of solids contained in solution in it. This can only be determined by analysis and in view of the great variation in the quantity of soluble salts found in the irrigation waters of Cyprus it is desirable that supplies should be analysed.

If unsuitable irrigation waters are avoided it is rarely that soils in Cyprus become brackish. The nature of the soil, natural drainage and amount of winter rainfall all combine to prevent an accumulation of Sodium salts.

SOURCES OF IRRIGATION WATER.

The main sources of water supplies for irrigating crops in Cyprus are derived from perennial springs, mountain springs and streams, wells, chains of wells and storage reservoirs.

Crops and agricultural lands are also irrigated in winter by conveying to the fields silt laden flood waters from torrents in river beds and water courses.

The capacity of the large perennial springs such as the Kythrea and Lapithos supplies practically never varies during the year or from year to year. Supplies from mountain streams in years of normal rainfall are usually sufficient to supply the needs of the cultivators holding the water rights for the production of summer crops but these supplies diminish considerably towards the end of summer. The replenishment of well water supplies in Cyprus depends mainly on the annual rains and quantity of snowfall on the mountains in winter. During seasons of drought or following winters of shortage of rainfall the underground water supplies are often considerably depleted. Silt laden supplies depend entirely on the seasonal rainfall and can only be utilized irregularly as climatic conditions permit.

The supplies from perennial springs and mountain springs and streams are mostly used by the village communities in the neighbourhood of these sources. In some cases these supplies are not developed to the best advantage owing to any attempts to improve the distribution of the water being hampered by the existence of ancient water rights. Efforts are made from time to time to improve on the utilization of this kind of supply with a view to bringing an increased area under irrigation by more economical use of the water.

Most of the irrigation water used in Cyprus is derived from wells on private properties. Wells are either circular or squared and the sides lined according to the nature of the well and means to be employed to raise the water to the surface.

Chains of wells are made by sinking a number of wells at regular intervals, linking up the wells underground by tunnels, and bringing the water to the surface by gravitation. In some places chains of wells extend to a distance of over two miles and the capacity of a chain of wells may be as much as 650,000 gallons of water per day.

Owing to the varied character of the geological formation of Cyprus the possibilities of finding underground water is problematical in many areas. A few years ago the Government organized a systematic scheme for drilling for water by portable well drilling machines. A number of valuable irrigation supplies were found and the success in this venture has stimulated interest by private enterprise in the search for underground supplies.

There are three irrigation storage reservoirs which are situated in the eastern Mesaoria. These reservoirs which were constructed by Government along with certain other irrigation works between the years 1899 and 1901 are at Kouklia, Akhyritou and Syngrasi. The object of the Mesaoria scheme was to impound surplus flood water from the Pedias and other rivers for irrigation purposes and to reclaim swampy lands. Large areas of swampy land were reclaimed and converted into agricultural land but the irrigation scheme was not altogether a success mainly on account of the irregularity and insufficiency of the supply due to failure to collect sufficient water in years of drought and difficulties in controlling the flood waters during years of ample rainfall. Although the three reservoirs in their present form are designed to command an area of approximately 12,000 acres they are used on a very modified scale for irrigation purposes and not more than 4,000 acres are likely to be irrigated in any one year.

Irrigation by conveying silt laden flood water from river beds during the winter rains fulfils two purposes :—

(*a*) Irrigating cereals and other winter crops following spells of drought.

(*b*) Flooding fallow fields in preparation for planting summer crops especially cotton, melons and water melons.

This practice especially for the latter purpose plays an important part in the agriculture of Cyprus and besides its value from an irrigation point of view it has a most beneficial effect on the land. This system of irrigation has been practised from time immemorial and traces of ancient dams, canals and water channels are still evident. The Venetian system for controlling the flood water in the river Tremithias at Kiti village in Larnaca District is still in existence. A new dam has been built on the site of the old Venetian dam and several other new dams have been constructed.

Besides the above sources of supplies of irrigation water efforts have been made to form storage reservoirs in natural depressions in mountain valleys but at present no important projects of this nature or any other important source of irrigation supplies have been developed.

EXTENT OF IRRIGATION.

During the year 1935 the estimated area of irrigated and unirrigated crops produced in Cyprus were :—

Kind of Crop	Area planted		Remarks
	Irrigated donums	Unirrigated donums	
Wheat	—	573,250	When possible wheat fields are irrigated by silt laden flood waters.
Barley	—	346,859	
Oats	—	35,912	
Maize	1,107	—	
Favetta	—	18,217	
Vetches	—	171,440	
Broad beans ..	—	14,645	One or two winter irrigations given before crop reaches maturity.
Potatoes	12,329	6,165	Two crops grow each year winter crop irrigated according to season. Summer crop dependent upon irrigation.
Cotton	10,739	32,217	
Sesame	—	7,076	
Cumin	—	12,878	
Onions	2,758	1,379	
Tomatoes	2,073	1,036	
Other vegetables ..	9,695	—	Includes colocasia, beans, cauliflowers, etc.
Citrus	11,700	—	
Other fruit trees ..	2,671	220	Includes pomegranates and deciduous fruits.
	53,072	1,221,294	

The irrigated areas referred to in the above and subsequent returns are crops irrigated from perennial water supplies. Fields irrigated by silt laden flood waters and cultivated land under vines, olives, carobs and almonds are not included.

The percentage of irrigated crops dependent entirely upon irrigation to non-irrigated crops of the total area under cultivation in 1935 was only some 4.5%. New areas of irrigable lands are being developed as irrigation water supplies become available especially for the development of citrus production.

The irrigation of winter crops by directing winter flood waters and surplus spring water is carried out extensively and at least some 10% of the cultivated area receives one or two irrigations in this manner.

The approximate percentage of areas of land irrigated in Cyprus from the principal sources of supply are :—

Source	Area under irrigation donums	% of total
Perennial springs and streams	18,000	33.9%
Wells	28,000	52.8%
Chains of wells	5,000	9.4%
Reservoirs	2,000	3.9%

Machinery and appliances for making Irrigation Water available from Wells.

The various types of water lifts in use in Cyprus for raising water from wells may be classified as follows :—

(*a*) Hand lifts adapted to lift water from a depth up to 25 feet ;

(*b*) Lifts operated by animal power for raising water from a depth up to 70 feet ;

(*c*) Windmills for lifting water from wells up to 100 feet deep ;

(*d*) Pumps and engines for shallow, medium and deep wells.

Hand types of water lifts are not used to a great extent for raising water for irrigation purposes in Cyprus. In some areas the Shadoff, locally known as the *Katia* or *Zygotiri*, is used on shallow wells not exceeding a depth of 25 feet for irrigating vegetable fields not more than one donum in extent. The Cyprus Shadoff consists of two wooden posts about 3 feet apart with a horizontal piece of wood joining the top to which is suspended a lever made from a tree branch. A forked tree stump is often used as the main post. On one end of the lever a stone weight is attached while from the end over the well a bucket or receptacle for raising the water is lowered into the well by a rope. This type of water lift is operated by one or two persons.

Water Wheels.—The most common method of raising water for irrigation in Cyprus is by the Persian water wheel locally known as an *alakati*. This type of water lift is eminently suitable for the small peasant proprietor who has an adequate well water supply at a depth of not more than 70 feet. The cost of maintenance of this type of water lift is practically negligible and the complete installation is made locally at a cost not exceeding £15. The wheel is operated by animal power, and the only maintenance expense is the supply of a small quantity of

lubricants for the bearings. If the installation is properly worked and the mineral contents of the water does not affect the iron the life of the appliance is approximately 25 years. The capacity of a Cyprus Persian wheel with seventy buckets is 1,800 gallons per hour and the approximate area which can be irrigated from the supply of an *alakati* is 6 donums.

In bygone days the *alakati* was completely made of wood but the various parts are now made of iron. In view of the importance of the *alakati* for irrigation in Cyprus the following description of the Cyprus locally-made Persian wheel is fully illustrated by a series of photographs. The description is prepared from a print drawn to scale by the Public Works Department and the photographs were kindly lent by Mr. Ramsay, Water Engineer, and Mr. Toundjian, of the Public Works Department.

The power pole is attached to a timber bearing fixed between two stone pillars and holding the horizontal wheel or skeleton drum in position. The horizontal wheel is four feet in diameter with 32 teeth approximately.

A vertical wheel also with 32 teeth approximately is adjusted over the well. A drum is rivetted to the vertical wheel and the water is raised in buckets attached to an endless chain which passes over the drum and deposits the water in the section of the drum directly underneath the bucket, the water then passes out through a discharge casting into a channel. The drum has a truncated cone centre 22″ in diameter at the larger end and 6″ in diameter at the smaller end. It is divided into 9 sections which are completely isolated and each section allows the water to pass through the discharge casting which is divided into 9 corresponding sections. When the wheel is operating a rapid outflow of water is obtained without any risk of returning the water to the well. A lever is adjusted at the side of the vertical wheel for preventing the drum reversing when the animal stops.

Windmills.—Raising water from wells by windmill is popular in many parts of Cyprus. This type of equipment is usually found installed in the grounds of private dwelling-houses for supplying water to irrigate the garden or in small fruit gardens 4 to 5 donums in extent. In the dry season there is usually enough wind of sufficient velocity to keep up the supply of water but an adequate storage tank is necessary to keep a reserve supply of water in hand.

The type of windmill in use in Cyprus is of modern construction with a vertically fitted wheel on a 40′ tower. The initial cost of this type of equipment is rather high for the relatively small area which can be irrigated and this kind of lift has gradually been replaced by pumps and engines.

The cost and capacity of a windmill depends mainly on the size of the wheel and the following figures are given as an approximate guide :—

Size of wheel	Approximate prices	Capacity of water per hour
8 feet	From £37	1,000 approximately
10 ,,	,, £50	2,000 ,,
12 ,,	,, £65	3,000 ,,
14 ,,	,, £75	4,000 ,,

Power Pumps.—The centrifugal pump driven either by electric motor or internal combustion engine is the type most favoured by the local farmer.

Only in exceptional instances, however, does the quantity of water available necessitate the installation of a pump having a delivery pipe greater than 3″ diameter.

Vertical plunger pumps, generally single acting, having one or more plungers have also a considerable following amongst the farmers, but as they are generally of greater initial cost and require greater attention they are being gradually supplanted by the more easily installed and operated centrifugal.

In many of the areas where Government artesian borings have revealed supplies of such quantity and at such depths as to effectively preclude the adoption of either of the above types of pump, proprietors have installed the turbo deep well unit having a delivery rate as high as 150 tons (33,600 gallons) per hour and driven by an internal combustion engine.

Storage and Conveyance of Water.

Storage tanks are required when the capacity of the *alakati*, windmill or power pump is less than 10,000 gallons per hour. These tanks are usually constructed of stone and their size depends upon the area to be irrigated and type of lifting installation.

The average size of a stone storage tank for a 6-donum holding is approximately $14' \times 14' \times 4'$. The cost of building a tank of this size is approximately £25.

When it is desired to pump the water direct to the land, a branch channel leads the water to the irrigation channels instead of direct to the tank.

Storage accommodation is not usually provided for the perennial and chain of wells supplies as there is usually a sufficient flow of water from these sources for the irrigation purposes demanded from them and large storage reservoirs to economize in the use of these supplies or bring greater areas under irrigation have not yet been established. The surplus of these supplies is usually diverted into a river bed through which it returns to the underground supplies again.

Most of the water controlled by Irrigation Divisions in Cyprus from perennial and chain of wells supplies is conveyed to the cultivators in open earth channels and ditches.

Where water is pumped to lands supplied by irrigation water from wells concrete channels are used to convey the water from the storage tank to the boundaries of the irrigable fields. The cost of constructing concrete channels depends upon the size of the channel.

Alakati-front view showing drum and vertical wheel.

Alakati-side view showing endless chain of buckets.

Alakati-side view showing discharge casting.

Alakati-back view showing horizontal wheel or skeleton drum.

The following are approximate figures for three different sizes :—

Size of channel	*Cost per foot*
14″ wide × 12″ deep	6*cp.* 7 *paras*
10″ „ × 8″ „	4*cp.* 13 „
8″ „ × 6″ „	3*cp.* 1 *para*

The water in most of the recently established citrus groves owned by Jewish settlers is conveyed by underground concrete pipes. This system, including value of the concrete pipes, opening for the outlet of the water and laying down the pipes cost at present approximately 4*cp.* per foot.

WATER RIGHTS AND LEGISLATION.

The legislation at present in force providing for the control of irrigation water is governed by the Government Waterworks Law, 1928, the Irrigation Law, 1931, and the Wells Law, 1896.

The Government Waterworks Law 1928 which repeals the Irrigation Law, 1897, provides for—

(*a*) All underground water (including second water) for which no measures have hitherto been taken enabling such water to be brought or raised to the surface or to run on to the surface ;

(*b*) All water running to waste from any river, spring, stream or watercourse ;

(*c*) All other waste water ;

to be the property of the Government and written permission is required from the Commissioner of the District before any water as above described can be utilized.

All water in any river, spring, stream or watercourse, whether subject to private rights or otherwise in respect of which any waterwork is undertaken, shall after making necessary provision for private rights as provided for in the Law becomes the property of the Government.

In this Law provision is also made whereby Government has powers to take, store or divert water to construct waterworks, acquire land and remove obstructions.

If prior to the commencement of the undertaking, it appears that existing rights are likely to be affected injuriously in any way by the carrying out of any waterworks, Water Commissioners are appointed to enquire into the nature and extent of the injury to the water rights affected.

The construction of wells is provided for under the construction of Buildings, Streets and Wells on Arazi Mirié Law 1927. Under this Law provision is made whereby no well shall be sunk or constructed on lands of the Arazi Mirié category without first obtaining a permit from the Commissioner of the District in which such well is to be sunk or constructed. Practically all land in Cyprus comes under the category of Arazi Mirié which is State land, the ownership of which is held under title deed. Existing wells and water rights are safeguarded under the Wells Law, 1896.

The Irrigation Law, 1931, provides for the formation of irrigation divisions with or without Government aid for the following purposes :—

(*a*) The construction, improvement, maintenance or repair of any irrigation works lying wholly or in part within the lands of a village or group of villages;

(*b*) The protection of common waters or watercourses and for the regulation of the use thereof;

(*c*) The maintenance of the water rights of the proprietors.

This Law repeals the Irrigation and Water Law, 1887, and includes all works undertaken or constructed under the provisions of the Law repealed. The provisions of the law does not apply to water rights held by registered title or *ab antiquo* possession without the consent of the holders of such possession or the majority of the proprietors.

CONCLUSION.

The foregoing is a brief outline of the present position in regard to irrigation in Cyprus. No rapid strides have been made in recent years in irrigation development but there is a tendency on the part of cultivators to improve on their old established customs and to introduce methods which research in irrigation have proved to be more advantageous. Engineering investigations have been made from time to time and numerous projects for accelerated development in irrigation have been submitted to Government for consideration but owing to the conditions under which the Cypriot peasant farmer works his land, it has not yet been possible to embark on any large scale organized scheme by which the peasants could purchase adequate and assured water supplies.

Considerable progress has been made in exploiting water supplies on private properties and necessary steps are taken to instruct the cultivators in proper methods of raising, storage, conveyance, application and duty of water.

Citrus Wastage Trials, 1936.

By R. M. NATTRASS, *Government Mycologist.*

1. Demonstration of Careful Handling.

Although it is a well-known and accepted fact that wastage of citrus fruit during transit to distant markets is caused in the first instance by injuries to the fruit during picking and subsequent handling, it was considered that a practical demonstration of the benefits of careful handling would do much to impress all engaged in the citrus export industry of the necessity for exercising the utmost care during the picking and packing of the fruit.

A small trial was arranged with the co-operation of Mr. A. Panaretos, Agricultural Officer, Famagusta, to be carried out on the fruit in the groves of the Government Experimental Citrus Station.

Five cases of fruit were picked by unskilled labourers in the way usually practised in the groves. The fruit was transported in baskets by motor-lorry to the packing shed and wilted for 7 days in a heap 6 to 8 fruits deep in accordance with the usual custom. The fruit was then wrapped and cased by skilled packers in a commercial packing house.

With the carefully picked fruit the pickers were equipped with locally-made cotton gloves, they were specially instructed to exercise special care in the use of the clippers and in every instance the stalk was clipped a second time before the fruit was placed in the collecting basket. The subsequent handling of the fruit resembled that of the control lot except that wilting was done in a layer two deep for the same period of 7 days, and until it was wrapped the fruit was handled at every stage with gloves. It was found that the wearing of a glove on one hand only was necessary for wrapping the fruit and that once accustomed to the feel it did not seriously affect the speed of the work.

The cases were transported by rail to Nicosia and placed in store for a further period of 23 days, *i.e.* 30 days from the time of picking. During this period the temperature of the store remained fairly constant at 60°F.

The cases were opened on 6th March and counts made of sound and wasted fruit with the following results :—

	Total No. of fruits	*Wasted fruits.*	% *Wastage.*
Careful handling ..	902	15	1.6
Control..	772	66	8.5

It is considered that injury to the fruit during picking and handling is caused largely by the points of the clippers bruising the fruit ; by badly cut stalks projecting from the fruit, and by the thumb nails of pickers and packers.

The above preliminary trial demonstrates that wastage can be considerably reduced by the exercise of due care and simple precautions.

2. Chemical Treatment of Fruit and Wrappers.

The preliminary trials carried out in the 1934–1935 season (2) showed that treatment of the fruit with " Shirlan," which had previously given good results in South Africa (1), and the use of wrappers impregnated with iodine showed considerable promise and warranted

a further trial. It was also necessary to ascertain the effect of such treatments on fruit arriving in Europe before further recommendations to the Cyprus producers could be made, and arrangements were made with the Secretary of the Cyprus Information Office in London, for experimentally treated fruit to be examined on its arrival at Covent Garden Market.

In previous consignments heavy losses had occurred through contact wastage, and it was considered that a more efficient method of isolating individual fruits or layers might do much to check this form of wastage. The two methods tried were the use of cellophane wrappers and the placing of a sheet of grease proof paper between each layer of fruit.

The iodine wrappers were prepared in the laboratory and as in the previous preliminary trial were impregnated with a solution made from the formula given by Tomkins (3). Each wrapper contained approximately 0.0127 grammes of iodine. The wrappers were kept in air-tight containers until used. The " Shirlan " solution used was of 1 per cent. strength of " Shirlan HB."

The fruit for the whole of this trial was picked from the same grove in Famagusta under ordinary commercial conditions on 5th February and was transported directly after picking to the packing shed, there being no adequate provision for wilting in the groves.

The " Shirlan " treated fruit was dipped immediately after arrival at the packing shed, the time of immersion being approximately half a minute. It was then spread out in a layer two deep and after twenty-four hours the fruit had dried with little signs of any deposit. It was left *in situ* for a further six days for wilting.

The fruit for the rest of the trial was wilted for seven days and was graded, wrapped and cased on 11th February.

One portion of the trial was transported by rail to Nicosia and kept in store for a period of 25 days and was examined on 6th March—31 days after picking.

The consignment to Covent Garden Market was shipped on S.S. *Destro* on 13th February and arrived in London on 29th February. The fruit was examined in Messrs. Margetsons' warehouse the following day.

The following report was received on the condition of the fruit and the amount of wastage present :

" Little waste was found in the fruit wrapped with iodised wrappers, which produced no ill effect on the appearance and consistency of the fruit.

Wastage was heavy in the cellophane wrapped fruit. The cellophane caused excessive sweating and did not check contact wastage.

The ' Shirlan ' treated fruit showed the best results. It was reported that ' the sound oranges were of excellent appearance and it was impossible to detect by look or smell that they had been treated in any way. The wrappers were perfectly clean.'

The sheets of grease proof paper between the layers of fruit did not check contact wastage.

Consignment ex S.S. "Destro," March, 1936.

Treatment	No of cases	Total No. of fruits	No. of waste	Percentage of waste
Iodised wrappers	20	2,991	117	3.91
'Shirlan'	5	702	27	3.84
Cellophane wrappers ..	14	2,282	342	15.00
Grease proof paper between layers	40	6,282	1,139	18.10

In this consignment no counts were made of any controls but the wastage on 477 cases was 40 cases or 8.37 per cent. Wastage of fruit from other consignments varied from 10 per cent. to 24 per cent.

The cellophane wrappers and grease proof paper appeared to have increased the amount of wastage.

The following figures were obtained on examination of the check consignment in Nicosia :—

Treatment	No. of cases	Total No. of fruit	No. of waste	Percentage of waste
'Shirlan'	8	1,021	25	2.4
Iodised wrappers	10	1,412	40	2.8
Cellophane wrappers ..	10	1,264	162	12.8
Control	10	1,372	106	7.6

It will be seen that these results agree closely with the figures obtained from the consignment to Covent Garden. The effect of grease proof paper between the layers of fruit was not tried in this consignment but the cellophane wrapped fruit showed an increase of wastage over the controls. The sound fruit in the cellophane wrappers presented a turgid and fresh appearance more attractive than any of the treated or control fruits. It appeared from the moist condition of the cellophane that excessive sweating was induced by this kind of wrapper and that conditions favourable to the development of waste were present."

Second Trial, 1935-1936 Season.

In view of the satisfactory report received of the "Shirlan" treatment and iodised wrappers it was decided to send a further and somewhat larger consignment of fruit with these two treatments to Covent Garden. It was anticipated that later in the season the amount of wastage would tend to increase and so provide a better test of the value of the treatment.

It will be seen below, however, that the wastage in the control was less than in the previous consignment. This may be accounted for by the fruit being mostly of the thin-skinned round varieties of the larger counts which under Cyprus conditions are not so liable to wastage as the thick-skinned oval types.

In this trial fruit was picked on 29th March, treated with "Shirlan" on 31st March, graded, wrapped and cased on 3rd and 4th April. The controls and iodised wrapped fruits were part of the same picking and were graded, wrapped and cased at the same time,

The "Shirlan" solution was a 1 per cent. "Shirlan" water soluble powder with .25 per cent. "Agral" added. About 100 fruits were dipped at a time in large wicker baskets and they were handled by workers wearing gloves. After draining the fruit was spread in layers two deep.

The iodised wrappers were impregnated with a slightly stronger solution than in the previous trial, each paper containing approximately 0.015 grammes of iodine.

The fruit was shipped on the S.S. *City of Lancaster* on 6th April and arrived in London on 22nd April.

The fruit was unloaded and examined on 27th and 29th April, with the following results :—

Treatment	No. of cases	Total No. of fruits	No. of waste	Percentage of waste
"Shirlan-Agral"	23	3,624	16	0.44
Iodised wrappers	10	1,478	9	0.61
Control	10	1,622	41	2.53

As a preliminary trial three cases of fruit were wrapped in cellophane wrappers coated with the same amount of iodine as the paper wrappers. No wasted fruit was found in any of these cases. The report also stated that neither the "Shirlan" treatment nor the iodised wrappers affected the selling qualities of the fruit one way or the other.

A portion of the trial was as in the previous trial transported to Nicosia, kept in store and opened on 1st May, with the following results :—

Treatment	No. of cases	Total No. of fruits	No. of waste	Percentage of waste
"Shirlan-Agral"	5	778	3	0.38
Iodised wrappers	4	594	9	1.50
Control	5	774	32	4.10
Iodised Cellophane wrappers	—	80	—	—
Control	—	39	1	2.50

In both portions of this trial both "Shirlan" and iodine showed a reduction of wastage over the control and "Shirlan" again showed a superiority over iodine and a greater superiority than in the earlier trial. This may be accounted for by the better technique of dipping, involving less damage to the fruit, and the incorporation of a wetting agent with the dip.

The incorporation of a fungicide in cellophane wrappers seems worthy of further experiment.

From these trials it appears that until such times as refrigerated ships and precooling plants are available a form of "Shirlan" dip may be recommended to reduce the heavy losses at present occurring, especially in the early consignments when the whole voyage has to be made with closed hatches. Later in the season most of the voyage is made with

open hatches which doubtless accounts in part for the reduction of wastage in these consignments.

Acknowledgments and thanks are due to Messrs. N. P. Lanitis & Co., for allowing the trials to be carried out on oranges shipped by them and for giving every facility in connection with treatments and packing, to Mr. A. Panaretos for invaluable assistance throughout and to Mr. Butler, Chief Grader and Inspector of Produce, and his staff for arragements for stowage on board, and especially to the Secretary of the Cyprus Government Information Office in London, for submitting reports on the condition of the consignments on arrival.

(1) Bates, G. R., "Wastage during the 1932 Export Season." The British South Africa Coy., Mazoe Citrus Experimental Station. Publication No. 2, c. 1933.

(2) Nattrass, R. M., "Prevention of Wastage of Citrus Fruit in Transit." *Cyprus Agricultural Journal*, XXX, pp. 84–87, 1935.

(3) Tomkins, R. G., "Iodised Wraps for the Prevention of Rotting of Fruit." *J. Pomol.*, XII, 4, pp. 311–320, 1934.

Topping and Suckering of Vines.

TOPPING of the vine is carried out during the summer season and is often referred to as summer pruning of the vine. Topping is carried out by vinegrowers in Cyprus on a fairly extensive scale especially in Paphos District, but usually it is done in such a way that it is more detrimental to the vine than beneficial.

The object of topping is to strengthen the growth of the young shoots and make them more resistant to the effect of wind damage, it also provides shade to the grapes by the formation of extra leaves which protect the fruit from the hot sun. The practice of topping is done by removing a portion of the shoots at the tip by pinching with the thumb and finger or by using a knife. It is important that the operation is done at the right season. Some growers carry out the operation with a view to securing a second flowering as the first crop is usually damaged by Eudemis. It is desirable that this practice should cease and it is advisable that growers practise topping more judiciously and at the proper time. By topping at the time of opening of the blossom, *coulure* or dropping of the flowers may be prevented. If topping is done earlier, secondary or auxiliary shoots will develop to the detriment of the setting of the flowers, if done later, *coulure* will not be prevented but the development of the already formed berries will be assisted.

Topping is usually advantageous at the time of the commencement of flowering. Vines lacking in vigour or suffering from insufficient moisture should not be topped as the operation may weaken the vine. Vigorously growing vines or vines growing in moist soils benefit by topping. Excessive or too late topping is detrimental to the vine and the grapes owing to the period of growth of the vine being prolonged. Late topping also lowers the sugar content of the grape.

Suckering is the practice of removing all suckers or growth which appear around the stem of the vine. By the removal of the superfluous growth the development of the remainder of the vine is assisted and the vine becomes more vigorous and productive. Suckering should be done as often as necessary during the season,

Potato Trials.

THE following summary of a (1) Report on Potato variety trials 1934-35, published in the *Journal of the National Institute of Agricultural Botany*, is published for the information of readers of this Journal in view of the local custom of using ordinary large size ware potatoes for "seed."

Part I of the Report deals with the effect of size of "seed" on the yields of the larger grades of ware potatoes and it is stated that previous investigations have established a relationship between the size of seed potatoes and both the total yield and the proportion of "ware" produced. Within certain limits a large sett tends to produce a heavier yielding plant than a small sett but the crop produced by small seed is made up of larger tubers. The trial was carried out to examine the effect of size of seed on the yield of ware potatoes, and cut setts were included in the trial as evidence was available that the use of cut setts leads to an increase in the proportion of ware in the crop.

The trial was carried out on a light sandy loam with three grades of seed referred to as large, medium and small. At the time of planting a part of the large seed was cut into halves and another part into quarters, the cuts being made longitudinally and referred to as halved and quartered seed.

The classes of setts tested were :—

Large, with an average weight of	..	..	5	oz.
Medium	,,	,,	,,	..	..	$2\frac{1}{2}$,,
Small	,,	,,	,,	..	..	$1\frac{1}{2}$,,
Halved	,,	,,	,,	..	..	$2\frac{1}{2}$,,
Quartered	,,	,,	,,	..	..	$1\frac{1}{4}$,,

The trial consisted of eight blocks, farmyard manure was applied at the rate of 16 to 18 tons per acre and at the time of planting the trial area received a dressing of 3 cwt. per acre of artificials containing equal parts of superphosphates, sulphate of potash and sulphate of ammonia. In the early stages the plants produced by the large setts appeared to be the most vigorous, owing to the production of a greater number of shoots; the growth of the plants from the quartered setts was irregular. At later stages no differences could be seen in the growth of any of the plots. The plots matured together and the produce was dressed over $1\frac{5}{8}$", $1\frac{3}{4}$" and 2" riddles.

In summarizing the results the crop of ware potatoes produced by the five classes of "seed" were compared. The yield of ware was reduced in each case by increases in the size of riddle from $1\frac{5}{8}$" to $1\frac{3}{4}$" and from $1\frac{3}{4}$" to 2".

Medium-sized whole tubers averaging $2\frac{1}{2}$ oz. in weight, produced heavier yields of ware than any other setts of smaller or equal size, and this superiority was increased when the ware was dressed over larger riddles. Larger seed produced similar yields of $1\frac{5}{8}$" and $1\frac{3}{4}$" ware to medium seed but was inferior to medium seed when a 2" riddle was used.

(1) "Potato Trials, 1934-35," B. Brandreth, B.A., *Journal of the National Institute of Agricultural Botany*, Vol. IV, No. 1, 1935.

Injurious Insects of Cyprus.

BY H. M. MORRIS, M.Sc., F.R.E.S., *Government Entomologist, Cyprus.*

[*Continued from March issue.*]

INJURIOUS INSECTS.

THYSANOURA:

Lepisma saccharina (Silver Fish, Fish Moth), occurs in houses and is destructive to paper, books and clothing.

ORTHOPTERA:

BLATTIDÆ (Cockroaches, "Black Beetles").

Blatta orientalis, L. and *Blatella germanica*, L., are common in houses, etc. *Periplaneta americana*, L., and *Polyphaga ægyptiaca*, L., also occur.

ACRIDIIDÆ:

Dociostaurus maroccanus, Thnb. (Moroccan Locust), is the most important locust and occurs abundantly. The area most seriously affected is the eastern end of the plain extending out to Cape Greco but they occur in all suitable parts of the plain extending westward to Morphou Bay. They also occur in the Karpas to the extreme end, in the area at the base of the Akrotiri Peninsula and westwards from Larnaca and Famagusta Bays. Small areas are also affected towards Cape Kormakiti and near the north coast.

This species breeds in hard uncultivated ground and the stoney ground thinly covered with a variety of plants in spring, such as occurs in patches throughout this area, is very suitable for it, these uncultivated patches occurring scattered amongst cultivated ground or in some areas being so extensive that the cultivated ground is in scattered patches amongst the uncultivated.

Oviposition occurs towards the end of May, the eggs hatching about the middle of the following March, hatching usually being 3 or 4 days earlier towards the eastern end of the plain than towards the western end.

A campaign is organized annually against this locust, a system of purchasing locusts which have been collected in hand nets being followed over the greater part of the area, poisoned bran bait being also used in some years since 1930 in some parts of the area affected.

Cereals are the principal crop affected by this species but the damage caused is usually small.

At the time of the British Occupation of Cyprus in 1878 very severe damage was caused annually by this locust and very extensive campaigns were necessary for some years until the numbers were considerably reduced, a system of screens and pits being employed. Spraying and poisoned bait were subsequently tried for a few years but were abandoned, and the collection of eggs was also carried out for a few years. The locust now occurs practically as a solitary grass hopper although very abundant in some areas. Hand collection commences soon after the hatching of the locusts and any tendency to form hopper swarms is soon broken up. The payment for the collection of the locusts is on the basis of the weight brought into the appointed purchasing places, and the price is reduced progressively with the growth of the insects and is maintained at a level such that an average labourer is able to earn a good days wage.

An account of this locust in Cyprus has been published by Stebbing (1).

Calliptamus italicus, L. (Italian Locust).—This locust occurs over much the same areas as *Dociostaurus maroccanus* but especially over the northern and western parts of the plain and to the north of the Akrotiri Peninsula, and it also occurs further west along this coast towards Paphos.

This species commences to hatch about three to four weeks later than *D. maroccanus*, towards the middle of April, and oviposition is correspondingly later.

This insect breeds in the edges of cultivated lands and especially in land which has gone out of cultivation for two or three years. Damage is sometimes caused to cotton seedlings.

This species is dealt with concurrently with *D. maroccanus*, being accepted for purchase at the same time.

Locusta migratoria, L. (ph. *solitaria*), (Migratory Locust).—The solitary form of this locust occurs. Conditions do not appear to be favourable for the development of the swarming phase and no damage by this species has been recorded.

Schistocerca gregaria. Forsk. (Desert Locust).—Invading swarms of this locust visited Cyprus in 1915, during the severe outbreak in Palestine and Egypt. There were two distinct periods of invasion, the first in March and April, and the second in August. The first swarms oviposited in some cases but the hoppers were destroyed shortly after hatching. The August invaders did not oviposit. Some damage was caused by the March and April swarms to vegetables, but more serious damage was caused by those arriving in August, some of which remained in the Island until December, during which time they were almost continually on the move and damaged vines, olive trees and other crops.

This 1915 invasion appears to have been the only one since the British Occupation in 1878. A single living specimen of this species was taken at Asomatos in the Akrotiri Peninsula on 5th May, 1930. Careful search in this and other areas failed to reveal any further specimens. A vague report was received, some three weeks after the event, of a swarm of locusts having passed over or spent a night at Alekhtora, a village in Limassol District, about 13th March, 1930. No further information and no specimens could be obtained.

While it appears that an invasion of Cyprus by this locust is possible during its years of maximum abundance in Syria, Palestine and Egypt, with the improvement of control measures in those countries the possibility of such an occurrence becomes more remote.

Thisœcetrus littoralis, Charp.—Some old specimens of locusts dated 1912, handed over to the Agricultural Department when the charge of the locust campaign was taken over by that Department were partly this species, but there is no information as to whether this was actually the most abundant species in that year. It occurs fairly commonly as a solitary grasshopper.

Anacridium œgyptium, L., is sometimes sufficiently numerous to cause slight damage.

A number of other species of Acridiidæ also occur but are not of special importance from the point of view of damage to crops.

(1) Stebbing, W. P. D., "The Locust in Cyprus," *Ann. App. Biol.* IV, 3, 1917, pp. 119–122.

TETTIGONIIDÆ:

Tettigonia viridissima, L. (Green Grasshopper, "Vrouchos").—This species causes a certain amount of damage occasionally, particularly to cotton and tobacco seedlings and also to broad beans. It is accepted for purchase with locusts during the locust campaign, but at a lower price owing to its larger size, when it is causing damage.

Decticus albifrons, Serv. ("*Skarnos*"), occurs similarly but usually in smaller numbers, and also *Metrioptera intermedia*, Serv.

GRYLLIDÆ:

Tridactylus variegatus, Latr., occurs fairly commonly and when present in numbers causes some damage to vegetables.

Liogryllus bimaculatus, Deg., has once or twice caused a certain amount of damage to vegetables.

Gryllotalpa gryllotalpa, L. (Mole Cricket), is a widely distributed pest in gardens and fields and is particularly destructive in seed beds or amongst newly-planted seedlings. Its burrows just beneath the surface of the ground cause shallow-rooted seedlings to be killed by drying out, while it custs through the main root of larger plants. The damage done is probably accidental in most cases as it is probably in search of insect and other animal food and does not usually eat plant material; it is nevertheless a very troublesome pest.

DERMAPTERA:

FORFICULIDÆ:

Several species occur, including *Forficula auricularia* L., but no damage has been recorded.

ISOPTERA:

Termites occur fairly commonly but as they are species which live in dead tree stumps or rotting wood they are not usually of importance. The only records of damage are the occurrence of termites in a bookcase in the Nicosia Club, when a bookcase and two or three books were damaged, some damage to shelves and paper stocks in the Government Printing Office and a case where termites damaged a few vine cuttings planted at Athalassa.

ANOPLEURA:

MALLOPHAGA.—No records available.

SIPHUNCULATA.—No records available.

THYSANOPTERA:

Species belonging to this order are only of importance occasionally, probably when conditions have been especially suitable for them.

Thrips tabaci, Lind, caused damage to melon plants in 1931 and measures were necessary against it. This insect has not been recorded as injurious in other years.

Cryptothrips brevicollis, Bagnall, was described as a new species and recorded as causing injury to vines in 1915 (Solomides) (1). Damage by this insect has not been recorded during recent years.

(1) Solomides, Z. S., "Notes on a Thrips injurious to vines in Cyprus," *Bull. Ent. Res.*, VI, 1915, pp. 197–199.

HEMIPTERA:

Pentatomidæ.—A number of species belonging to this family occur but only two or three are of any importance.

Dolycoris baccarum, L. (Stink Bug, "Vromousa") occurred in large numbers in 1927 in the cultivated areas of the higher villages in the southern mountains from about 1,500 or 2,000 feet to the highest at about 3,500 feet, and caused a good deal of damage to cereals and various vegetables, (potatoes, beans, peas) and to various fruits. There had apparently been small and unimportant attacks in previous years which had not been reported but the damage that year was considerably greater. In 1928 the occurrence and damage were about the same but in the following years there was a considerable diminution.

The insects appear in the villages at about the same date annually, usually between 15th and 20th May. They are spoken of by the villagers as arriving in swarms and it has also been reported that they fly in swarms when leaving the villages in June.

By the time they reach the cultivated fields the cereal crops are almost ripe, but some damage is caused to them at first before the grains become too hard. Later they attack beans, potatoes, peas, vines, etc. They also attack fruit to a certain extent, particularly cherries, which is the only kind of fruit ripe then in that area.

The insects appear to prefer to feed in groups on a plant rather than scattered more or less uniformly over the crop. Their presence on potatoes soon causes wilting of the plant on which they are feeding, particularly of the younger parts of the plant on which they chiefly feed, and which do not recover. When they feed on bean pods they cause a spotting of the seeds inside; when wheat is attacked they feed on the ear and cause the grains to shrivel.

The insects appear to have a single generation only as the damage continues only until the last few days of June, about 6 weeks from its commencement, and the insects then disappear from the fields and collect chiefly on *Chionistra* and other summits of Mount Olympus (6,400 feet) and also on other of the highest mountains in the Island. In these situations they are to be found in masses under loose stones throughout the remainder of the summer and under the snow in the winter. When the stones are moved the insects are very active in hot sunny weather, but do not readily take to flight.

These summits are sparsely covered with dwarfed pine trees and various bushes, but the more succulent plants on which the Pentatomids might be expected to feed are going over and dying down by the time the insects reach these places, and they do not appear to feed at all during the time they spend on these summits.

In places where, as on the summit of *Chionistra*, there are piles of loose rocks the Pentatomids occur in enormous numbers and their presence can be recognized by the smell.

Commencing in 1928 great numbers of the insects have been destroyed, chiefly on *Chionistra*, by means of "Cyanogas" dust. It has also been found that an average of about 50% are parasitised by Tachinid larvæ, and *Gymnosoma rotundatum*, L., and another species have been bred from them.

There have been some reports of damage by these insects in the autumn, but the numbers then occurring in cultivated fields have been small.

Eurydema festiva, L. and var. *pictum*, H.S.—This species and its variety occur fairly commonly and damage is sometimes caused, particularly to potatoes, in various parts of the Island.

Eurygaster integriceps, Put., appears to be widely distributed but only slight damage has been recorded by it on one or two occasions. This species is a serious pest, particularly of wheat, in Syria, Turkey and Iraq where its habits appear to be very similar to those of *Dolycoris baccarum* in Cyprus.

Stenozygum coloratum, Kl., occasionally causes damage to young shoots of citrus.

Nezara viridula, L., has caused slight damage once or twice to vegetables.

A number of other species of Pentatomidæ occur but have not been recorded as causing damage to crops.

CIMICIDÆ :

Cimex (species not determined) (Bed Bug), occurs commonly in houses.

COREIDÆ, CAPSIDÆ, etc.—Various species occur but no serious damage has been recorded.

LYGÆIDÆ :

Oxycarenus hyalinipennis, Costa., is often abundant but does not cause serious trouble.

Lygæus pandurus, F., is common everywhere but has not been recorded as causing damage.

TINGIDÆ :

Stephanitis pyri, F., occurs abundantly in most areas on apple and pear trees and also (probably the same species) on poplar, and causes a certain amount of damage, and sometimes complete defoliation.

Galeatus scrophicus, Saund., taken damaging chrysanthemums.

CICADIDÆ :

Cicada orni, L., is the commonest species and occurs abundantly in the summer, when the noise they make is almost deafening. A certain amount of unnoticed damage must be caused to roots of fruit and other trees by the nymphs, which live in the soil. *Cicadatra atra*, Ol., is also common and *Tibicen plebeja*, Scop., occurs less commonly.

JASSIDÆ :

(Identification not received). Occurring on almond trees at Saittas and apples at Trikoukkia, causing curling of leaves and stunting of shoots.

PSYLLIDÆ :

Euphyllura olivina, Costa., occurs fairly commonly on olive trees but is not of great importance.

ALEYRODIDÆ :

Aleurolobus olivinus, Silvestri, is widely distributed on olive trees but unimportant.

Aleurotrachelous cyprusi, Dozier, occurs on pomegranates but is unimportant.

APHIDIDÆ.

Aphis rumicis, L. (Black Aphis, "Psora").—This species is a serious pest of broad beans but the incidence of the attack varies considerably from year to year. In bad years it may cause complete loss of crop in badly affected fields.

Aphis gossypii, Glov., occurs very commonly on cotton and melon plants and sometimes causes serious damage.

Doralis punicæ, Pass., is recorded on pomegranate.

Doralis pomi, Deg., recorded on apple.

Dentatus roseus, Baker, also recorded on apple but neither species is usually abundant.

Toxoptera aurantiæ, B.d.F., fairly common on citrus trees.

Lachnus persicæ, Burn., is fairly common on the trunk and branches of almond, peach and plum trees.

Brevicoryne brassicæ, L., common on cabbages, cauliflowers and other cruciferous plants.

Chromaphis juglandis, Goetze, occurs on walnut trees.

Hyalopterus arundinis, F., frequently causes a considerable amount of leaf curl on almond and peach trees.

Eriosoma lanigerum (Hausm.) ("Woolly Aphis"), occurs fairly commonly on the comparatively small number of apple trees growing in the lower parts of Cyprus, but is of small importance there. It also occurs in some of the higher areas where apples are an important crop, but the damage caused by it is not of serious importance.

COCCIDÆ:

Many species of scale insects occur on wild and cultivated plants, of which the following are the most important:—

Chrysomphalus aurantii, Mask. (Red Scale).—This species occurs very commonly on citrus trees, especially lemons, and in cases of heavy infestation causes defoliation. Carob, mulberry, rose and other plants are also attacked. This is the most important citrus pest in the Island and a certain amount of spraying and fumigation are carried out against it.

Aspidiotus hederæ, Vallot. (White Scale), is very common and widely distributed, occurring on a large variety of host plants. It occurs in great abundance on carobs in some areas but otherwise its attacks are not of great importance, although plantations of Wattle (*Acacia sp.*) are often heavily attacked. This species has been recorded (1) as occurring on lemons imported into Egypt from Cyprus, but search of citrus plantations in Cyprus had failed to reveal this scale on citrus, even in localities where the citrus plantations adjoin wattle which is heavily attacked by it. It is recorded as attacking lemon trees in Italy and France.

Aspidiotus latanicæ, Sign. (*cydoniæ*, Comst.)—This scale has been recorded (1) on citrus fruit from Cyprus on arrival in Egypt, but as a result of search in Cyprus it has been stated to occur in small numbers only and to be of little importance.

(1) Hall, W. J., "The Insect Pests of Citrus Trees in Egypt." Ministry of Agriculture, Egypt, *Tech. and Science Service Bulletin* No. 45.

Aspidiotus britannicus, Newst.—Recorded on carob, but unimportant.

The absence of *Chrysomphalus aonidum*, L., and *C. dictyospermi*, Morg., is worthy of note, and it is to be hoped that it will be possible to prevent their being introduced.

Ceroplastes rusci, L.—Very abundant on fig trees in several areas and causes some damage. It has also occurred on orange trees in one or two localities, the sooty mould which accompanies it causing discolouration of the leaves and fruit. It occurs commonly on oleander and *Cratagus azarolus*.

Ceroplastes floridensis, Comst., and *Icerya purchasi*, Mask., were introduced on citrus seedlings from Palestine in 1934 but efforts which have been made to eradicate them appear to have been successful and they may be completely eradicated.

Lecanium elongatum, Sign., occurs occasionally on carob but is unimportant.

Lecanium hesperidum, L.—This species occurs commonly on citrus but seldom in sufficient quantity to be of much importance.

Lecanium persicæ, Geoff., has been recorded on mulberry but is unimportant.

Lecanium (*Saissetia*) *oleæ*, Bern., occurs on olive and quince but is not abundant. This species has only occasionally been recorded on citrus in Cyprus although it is recorded as a serious pest in French North Africa (1).

Chionaspis striata, Newst, occurs on Thuja and Cypress.

Lepidosaphes ulmi, L.—Common on Carob.

Lepidosaphes beckii, Newm. (Mussel Scale).—Citrus trees in a small area including Limassol town were found in 1934 to be heavily infected with this scale. Extensive fumigation has been carried out since with a view to preventing its spreading to other areas.

Lepidosaphes conchiformis, Gmel., occurs on pomegranate.

Lepidosaphes ficus var. *nicosiæ*, Green, occurs on fig.

Leucaspis knemion, Hoke, recorded on *Pinus pinea*.

Leucaspis pusilla, Loew., recorded on *Pinus canariensis*.

Leucodiaspis riccæ, T.T.—This species occurs widely on olive leaves and fruit, sometimes in great abundance. Its presence on the fruit causes a dark patch.

Parlatoria oleæ, Colv., occurs commonly on fruit trees, (apple peach, loquat, etc.).

Parlatoria zizyphi, Lucas.—Stated (2) to occur on fruit, especially on lemons, imported into Egypt from Cyprus, but not otherwise recorded.

Parlatoria pergandii, Comst.—Stated (2) to occur in Cyprus; also recorded on apple.

Pollinia pollini, Costa., occurs commonly on olive trees.

Targionia vitis, Sign.—Common on vine.

Pseudococcus citri, Risso, (Mealy Bug.), occurs fairly commonly on various plants, including citrus trees, but not usually in any great numbers.

(1) Freeborn, S. B., "Citrus Scale Distribution in the Mediterranean Basin." *Journ. Econ. Ent.*, XXIV, No. 5, 1931, pp. 1025–1031.

(2) Hall, W. J., "The Insect Pests of Citrus Trees in Egypt." Ministry of Agriculture, Egypt, *Tech. and Science Service Bulletin* No. 45.

[*To be continued in September issue.*]

EDITORIAL AND ADVERTISEMENT NOTICES

All communications for publication should be addressed to the Editor, *Cyprus Agricultural Journal*, Department of Agriculture, Nicosia.

Contributions are invited, written on one side of the paper only. It should be understood that unaccepted manuscripts can not be returned unless postage is prepaid.

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The "Cyprus Agricultural Journal" is published in March, June, September and December.

The Editor does not necessarily endorse the statements or opinions expressed in contributed articles, the responsibility for which rests with the authors.

The Horse Breeding Law, 1930.

LIST OF STALLIONS LICENSED FOR 1936.

NICOSIA DISTRICT.

Village	*Owner's name*	*Reg. No.*
Akaki	Michael Th. Rafti	29
do.	Elias M. Tsinga	203
Argaki	Polyvios Theophani	153
Astromeritis	Christoforos Evangeli	26
Elea	Rejeb Ahmed	254
Kalokhorio	Yioryis Papaconstantinou	262
Kochati	Halil Mehmed	264
Lefka	Yiangos G. Boyiadji	20
Lymbia	Andronikos Petri	32
do.	Kyr. Constantinou	33
Mammari	Sotiris Ioannou	206
Morphou	Vasilis T. Spanos	18
do.	Andreas Ahapittas	249
Nicosia	Haji Costas Haji Panayi	62
Philia	Towlis Haralambou	255
Yeri	Yeoryos Petri	16
Yerolakkos	Haralambos Sophokli	194

LARNACA DISTRICT.

Alaminos	Salih Jumaa	64
Aradhippou	Costis Kyriakou	15
do.	Lefteris Towli	225
do.	Gregoris Sava	261
Athienou	Yiangos N. Kalapodha	22
do.	Haris Antoni	66
do.	Costas N. Haji Vrashimi	96
do.	Vasilis M. Phiakou	159
Kalopsidha	Yeorgios Antoniou	267
Kophinou	Hussein Handji Ibrahim	209
Voroklini	Panayis Theodosi	106
do.	Haral. A. Chapoulis	220

FAMAGUSTA DISTRICT.

Angastina	Gavriel G. Kamenou	260
Asha	Antonis Michael	92
do.	Demetris Kounallis	208
do.	Christos Haji Lavithi	234
do.	Kyriakos Antoni	239

Village	*Owner's name*	*Reg. No.*
Ayios Andronikos ..	Spyros Yeoryi ..	65
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ROBERT J. ROE,
Chief Veterinary Officer,
Inspector of Horse Breeding.

30th June, 1936.

Meteorological Data, Cyprus.

SUMMARY OF OBSERVATIONS AT REPRESENTATIVE STATIONS.

MARCH, 1936.

District and Station	Shade temperature Mean Maxim.	Shade temperature Mean Minim.	Rainfall Total inches	Rainfall No. of days rain	Rainfall Greatest fall in one day	Rainfall Average for 10 years inches	Rainfall Dates on which snow fell
Nicosia District:							
Nicosia	69.36	44.81	0.74	6	0.29	0.76	—
Athalassa	—	—	0.82	7	0.27	0.93	—
Morphou	—	—	—	—	—	0.59	—
Makhæras	—	—	—	—	—	1.75	—
Famagusta District:							
Famagusta	71.58	46.87	0.49	3	0.40	0.82	—
Akhyritou	67.90	44.00	0.45	3	0.27	0.89	—
Rizokarpaso ...	—	—	0.68	2	0.40	1.34	—
Lefkoniko	—	—	1.72	4	0.86	0.91	—
Larnaca District:							
Larnaca	71.00	44.00	1.26	6	0.48	0.95	—
Lefkara	—	—	1.03	4	0.40	1.15	—
Limassol District:							
Limassol	69.87	45.55	0.85	5	0.51	1.14	—
Saittas	—	—	1.13	6	0.76	1.75	—
Trikoukkia	53.87	37.48	1.60	4	1.10	3.09	—
Alekhtora	—	—	1.70	5	0.60	1.14	—
Paphos District:							
Paphos	—	—	1.90	2	1.65	1.40	—
Polis...	—	—	1.43	5	0.95	1.49	—
Kyrenia District:							
Kyrenia	66.17	48.19	1.04	5	0.47	1.25	—

APRIL, 1936.

Nicosia District:							
Nicosia	74.77	52.50	1.06	3	0.68	0.63	—
Athalassa	—	—	1.07	4	0.44	0.85	—
Morphou	88.33	49.00	0.13	1	0.13	0.48	—
Makhæras	—	—	—	—	—	0.74	—
Famagusta District:							
Famagusta	77.77	53.43	0.47	3	0.25	0.59	—
Akhyritou	75.00	52.10	0.79	5	0.37	0.60	—
Rizokarpaso ...	—	—	1.31	5	0.70	0.68	—
Lefkoniko	—	—	2.04	5	1.55	1.11	—
Larnaca District:							
Larnaca	76.00	52.00	1.07	5	0.47	0.81	—
Lefkara	—	—	3.15	2	3.10	0.89	—
Limassol District:							
Limassol	75.13	52.07	0.83	6	0.50	0.72	—
Saittas	—	—	0.50	6	0.20	1.02	—
Trikoukkia	60.52	45.00	1.08	4	0.50	1.81	—
Alekhtora	—	—	0.33	2	0.26	0.93	—
Paphos District:							
Paphos	—	—	1.32	4	0.70	0.83	—
Polis...	—	—	0.50	1	0.50	0.55	—
Kyrenia District:							
Kyrenia	71.20	54.40	0.15	4	0.04	0.84	—

Note.—Compiled from returns furnished by Public Works Department

MAY, 1936.

District and Station	Shade temperature Mean Maxim.	Shade temperature Mean Minim.	Rainfall Total inches	Rainfall No. of days rain	Rainfall Greatest fall in one day	Rainfall Average for 10 years inches	Rainfall Dates on which snow fall
Nicosia District:							
Nicosia	80.97	56.65	3.01	8	0.88	0.74	—
Athalassa	—	—	3.58	6	1.50	0.61	—
Morphou	88.64	54.48	2.55	5	0.90	0.33	—
Makhæras	—	—	—	—	—	0.54	—
Famagusta District:							
Famagusta	82.46	59.23	1.52	6	0.74	0.28	—
Akhyritou	79.80	56.70	2.43	6	0.92	0.26	—
Rizokarpaso ...	—	—	0.62	3	0.36	0.61	—
Lefkoniko	—	—	3.13	7	1.85	0.96	—
Larnaca District:							
Larnaca	82.00	56.00	0.50	5	0.15	0.21	—
Lefkara	—	—	2.06	6	0.64	0.35	—
Limassol District:							
Limassol	78.84	57.39	1.15	6	0.42	0.25	—
Saittas	—	—	4.85	9	1.60	0.80	—
Trikoukkia... ...	—	—	4.65	8	1.32	1.28	—
Alekhtora	—	—	1.22	3	0.70	0.48	—
Paphos District:							
Paphos	—	—	1.15	8	0.30	0.48	—
Polis...	—	—	0.65	4	0.42	0.49	—
Kyrenia District:							
Kyrenia	75.25	58.17	1.60	7	0.49	0.58	—

Note.—Compiled from returns furnished by Public Works Department.

Department of Agriculture, Cyprus.

HEADQUARTERS—NICOSIA.

ALL general correspondence should be addressed to the Director of Agriculture.

Correspondence and applications for advice referring to the Veterinary, Entomological, Mycological or Chemical Branches, should be addressed to the Officer in charge of the Branch. When seeking advice in regard to treatment of plant pests or diseases, specimens should, whenever possible, be sent.

GOVERNMENT STOCK FARM, ATHALASSA AND DISTRICT STUD STABLES.

Applications for services of stud animals at Athalassa or the supply of live stock, poultry, eggs, etc., should be addressed to the Manager, Stock Farm, Athalassa. Applications for services of stud animals at District Stud Stables should be made to the Stud Groom in charge. There are Stud Stables at Famagusta, Vatili, Rizokarpaso, Ayios Theodhoros, Lefkoniko, Larnaca, Limassol, Paphos and Polis.

CENTRAL EXPERIMENT FARM, MORPHOU.

Applications for permission to visit the Central Experiment Farm, Morphou, should be made to the Officer in Charge of the Farm.

SAITTA EXPERIMENTAL VINEYARD AND VITICULTURIST'S LABORATORY.

Requests for the examination of wines and advice in regard to viticulture should be addressed to the Viticulturist and Wine Expert, Limassol.

DISTRICT ORGANIZATION.

Applications for agricultural advice should be addressed to the Officer in charge of the district or area in which the applicant resides. All applications for seeds or plants should be made to the Officer in charge of the nearest Nursery Garden.

NICOSIA DISTRICT.

Agricultural Officer, Mr. S. Maratheftis, is in charge of the district, including the Nursery Garden, Nicosia, and Officers are stationed at Kythrea, Dheftera and Morphou.

Lefka Sub-District.—Agricultural Officer, Ibrahim Hakki Effendi, is in charge, including Pyrgos area.

FAMAGUSTA DISTRICT.

Agricultural Officer, Mr. A. Panaretos, is in charge, including Famagusta Nursery Garden and Citrus Experimental Grove. Officers are stationed at Yialousa, Vatili, Lefkoniko and Trikomo and Tobacco Instructor at Yialousa.

LARNACA AND LIMASSOL DISTRICTS.

Agricultural Officer, Mr. M. Papaiacovou, is in charge, including Larnaca Nursery Garden. Officers are stationed at Larnaca, Lefkara, Nisou, Agros and Limassol.

KYRENIA DISTRICT.

Agricultural Assistant, Mr. E. Kyprianides, is in charge, including Kyrenia Nursery Garden, Lapithos Citrus Station and Lapithos area. Tobacco Instructor, Mr. E. Demetriou, is stationed at Kyrenia District.

PAPHOS DISTRICT.

Assistant Superintendent of Agriculture, Mr. A. Klokkaris, is in charge. Paphos District includes Paphos and Polis Nursery Gardens and Officers are stationed at Polis, Stroumbi, Yeroskipos and Ayios Amvrosios (Limassol District).

TROODOS AREA.

Trikoukkia Nursery Garden and Troödos area is in charge of Mr. K. Hamboullas, Agricultural Assistant.

Table Showing Distribution of Stud Animals at the Stud Stables and Government Stock Farm, Athalassa on 1st July, 1936.

Station	*Stallion*	*Jack Donkey*	*Bull*	*Breed*
—	—	—	—	—
Athalassa ..	Corby Bridge ..	No. 42 (Spanish) ..	No. 480 (Ambassador) ..	Shorthorn
	Moleskin ..	No. 38 ..	No. 456 ..	Kerry
	Mazarin ..	— ..	No. 469 ..	Cyprus
Ay. Theodoros	Pitchford ..	No. 50 ..	No. 461 ..	Cyprus
Famagusta ..	Friars Flutter ..	No. 51 ..	No. 443 ..	Cyprus
Larnaca ..	Lifeline ..	No. 52 ..	No. 462 ..	Crossbred
Lefkoniko ..	Marcher Lord ..	No. 54 ..	No. 468 ..	Cyprus
Limassol ..	Canterbury ..	— ..	— ..	—
Morphou ..	— ..	No. 47 ..	— ..	—
Nicosia ..	— ..	— ..	No. 450 ..	Crossbred
Paphos ..	Llwynog's Model	No. 41 ..	No. 454 ..	Kerry
			No. 459 ..	Cyprus
Polis ..	— ..	No. 49 ..	No. 451 ..	Kerry
Rizokarpaso ..	— ..	No. 45 ..	No. 460 ..	Cyprus
Vatili ..	Waterkoscie ..	No. 48 ..	No. 458 ..	Cyprus

Notes : 1.—There are also Boars at all the above stations except Nicosia, Morphou and Limassol and there are he-goats at all stations except Morphou, Limassol and Vatili.

2.—The Stallion at Limassol will travel to Evdhimou and back, and that at Paphos to Polis and back, every month.

3.—Boars and he-goats may be issued on loan to *bona fide* applicants upon application to the Director of Agriculture or Manager Stock Farm, Athalassa.

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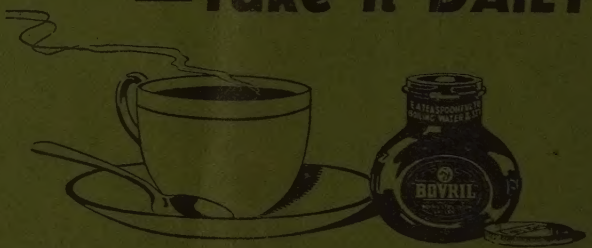

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